

display may be included in a central portion of the vehicle. For example, the display may be greater than a certain diagonal size (e.g., 10 inches, 13 inches, 15 inches, 17 inches, 21 inches, and so on). Since the display, in some embodiments, may be positioned centrally and be greater than the certain diagonal size, the display may provide a centralized interface at which control and/or operation of the vehicle occurs. Thus, ensuring that the centralized interface is easy to understand and utilize may enhance usability of the vehicle. As will be described, the enhanced user interfaces dynamically unify (e.g., aggregate) an autonomous visualization (e.g., visualizations generated from sensors about the vehicle), map information, navigation information, and/or vehicle functionality controls.

**[0036]** One embodiment of the invention is a vehicle having a user interface (referred to herein as a unified user interface) that may dynamically update based on contextual information which relates to operation of a vehicle. For example, contextual information may indicate that the vehicle is in park or is being driven. As another example, contextual information may indicate that the vehicle is navigating towards a destination and/or is being autonomously or semi-autonomously controlled. As another example, contextual information may indicate that the vehicle is towing a trailer, being driven off-road, and so on. As another example, contextual information may relate to control of vehicle functionality. The unified user interface, as will be described, includes easy-to understand interactive elements which are responsive to the current contextual information.

**[0037]** With respect to the vehicle being in park, the unified user interface may present an autonomous visualization including a graphical depiction of the vehicle that can be selected using a touch-screen interface. Vehicle controls may be included on the graphical depiction, such that an end-user can open a trunk, open/close windows, disconnect or connect a trailer, and so on. In some embodiments, the autonomous visualization may include a graphical representation of a real-world environment in which the vehicle is located. With respect to the vehicle being autonomously or semi-autonomously controlled, the unified user interface may present an autonomous visualization overlaid onto map information. For example, autonomous visualization may include representations of a surface on which the vehicle is driving. In this example, the graphical depiction of the vehicle may be illustrated in a particular lane of a road along with graphical representations of other vehicles or objects which are proximate to the vehicle. As an example, representations of lane lines, off-ramps or on-ramps, pedestrians, hazards, signs, or other objects may be included. The map information may include a graphical representation of a portion of a map in which the vehicle is being driven. For example, the map information may inform a number of lane lines on a current road, other roads proximate to the current road, or other map-based information. For example, roads may be represented along with identifiers of the roads.

**[0038]** With respect to the vehicle being navigated towards a destination, the unified user interface may include an autonomous visualization, map information, and navigation information. As will be described, the unified user interface may graphically depict navigation events (e.g., upcoming turns, off-ramps, on-ramps, and so on) identified in navigation information. For example, the unified user interface may graphically depict that the vehicle is to move

from a current lane to a different lane. Furthermore, the unified user interface may cause the presented information to zoom in or zoom out depending on contextual information. For example, a zoom level may be set which causes an adjustment of a size of the autonomous visualization, map information, and navigation information.

**[0039]** As an example, as the vehicle exits a highway off-ramp the presented information may zoom out. In this example, the autonomous visualization (e.g., the graphical depiction of the vehicle) may become smaller with the portion of map information representing a larger real-world geographic area (e.g., more roads may be depicted) becoming relatively larger. Upcoming navigation events, such as a navigation route, may similarly be zoomed out such that a larger portion of the route is shown. In this way, the end-user may be presented with upcoming turns on surface roads. After the user exits the off-ramp and drives on a surface road, the presented information may optionally zoom in.

**[0040]** Additional contextual information may relate to control of vehicle functionality, such as playing music, adjusting air conditioning, streaming video, overlaying video obtained from one or more cameras, and so on. As may be appreciated, control of such vehicle functionality may consume varying portions of the user interface. For example, to adjust an air conditioning setting the user interface may present air conditioning controls. As will be described, the unified user interface may ensure that the autonomous visualization, map information, and/or navigation information, remains unobstructed from view. For example, an end-user may select a user interface element to control an air conditioning setting while navigating towards a destination. In this example, the unified user interface may adjust presentation of the autonomous visualization, map information, and/or navigation information and include the air conditioning controls, or an overlay of the air conditioning controls over the navigation display. An example technique to adjust the presentation of information to the passenger may include moving the autonomous visualization, map information, and/or navigation information to a different portion of the unified user interface (e.g., further from the end-user). Another example technique is to overlay certain controls on top of the map or navigation information.

**[0041]** Contextual information may therefore relate to operation of the vehicle. Example contextual information is described herein however it is to be appreciated that other information may be used and fall within the scope of the disclosure. For example, contextual information may indicate that the vehicle is navigation to a location. In this example, contextual information may reflect a location of the vehicle with respect to the location. As an example, the location may indicate upcoming, or prior, driving events (e.g., turns, lane changes, and so on). Thus, as the vehicle is navigating to the location the contextual information may be updated based on the location. In this way, and as will be described, the user interface may update based on the location (e.g., a presented map may zoom out, and so on).

**[0042]** While the description above focused on a user interface being presented on a display, in some embodiments multiple displays may be used. For example, a first display may be positioned proximate or in front of a driver of a vehicle. In this example, a second display may be positioned in a central portion of the vehicle or in a position further from the driver. As an example, the vehicle may represent a semi-truck with two or more displays.